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# ANIMAL LIFE IN THE SEA

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INSTRUCTOR LITERATURE SERIES

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## Queer Creatures, from Sponges to Whales

BY

*Harriet G. Reiter*

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## SPONGES

Do you know that for a long time it was not known for sure whether sponges were animals or vegetables? After much study and investigation by naturalists it was settled that they were members of the animal kingdom. Their home is at the bottom of the sea. The part that we use is the skeleton. The living sponge in the ocean looks very different.

Probably all the animals you have ever seen have eyes and ears and a mouth. They do not have to stay in one spot but can move about in some way from place to place. But sponges are not like that at all. They have to have air, yet they have no lungs; they must have food but they have no mouth and no stomach. They are one of the very lowest forms of life. We see and use sponges so often and they are so familiar to us that we never think to look at them carefully. If we did so, we should see they were indeed curious and interesting.

Perhaps you have noticed that the sponge skeleton was formed of horny fibers woven so closely together that it formed a lacy net-work, and through this net-work were holes. A sponge does not look like a silk-worm, yet it has been found that the substance that forms the fiber of the sponge skeleton and the fiber of the cocoon of the silk-worm is very much alike. Different varieties of sponges have different frame-works, and not all kinds can be used by us.

When the sponge skeleton was a living sponge at home on the bottom of the sea it was all covered by a jelly-like substance, about as thick as the white of an egg. This is the real sponge animal and covers every part of the horny framework. When it is alive it has many beautiful colors. Some varieties are brilliant green, others orange, red, or yellow. In the living sponge constant streams of water are drawn through the holes to every part of the sponge. These carry little particles of food and all the air that it needs to breathe. As soon as the animal dies this flesh decays. In the sponges prepared for commerce it is removed.

The circulation of water through a sponge is very curious. There are little cup-shaped hollows in the canals in which are tiny threads of soft flesh extending, called cilia. Their work is to wave gently and constantly and urge on the flowing water. The water is taken in at the smaller holes, urged on through every part of the sponge and finally thrown out at the larger holes. With a microscope, tiny fountains may be seen constantly playing from the large holes of a living sponge.

When any food comes in contact with any part of the body it immediately sinks in and forms a little sack. The jelly-like substance all around creeps up until the food is entirely covered. There it stays until the food is entirely digested and then the flesh sinks back to its original position and any shell or other substance that is left floats away.

At certain seasons little oval masses of jelly break away from the parent sponge and float about in the canals. By and by they become perfect eggs with delicate cilia at one end, then they are thrown out by the water in the little fountains. Now instead of sinking right down to the bottom and commencing the serious business of starting another sponge family, the little cilia at the end wave back and forth with a rapid motion and the little egg is rowed about as if determined to see some fun, at least while it was young.

Sometimes they meet a sad end and are gobbled up by some monster of the sea. If not, they finally sink down and fasten themselves to a shell or rock and grow into a perfect sponge.

The finest sponges are found in the Mediterranean and Red Seas. Divers go down and search for them under rocks and cliffs. When found they are cut very carefully away so that they may be in no way injured. These sponges are very expensive and are used by surgeons. This business is carried on by the Turks and many thousand dollars worth of sponges are collected every year. The Gulf of Mexico and the sea around the Bahama Islands produce a coarse and common variety of sponges. These are scraped off the rocks by forks attached to long handles.

A very curious variety of sponges is the boring-sponge. It spreads itself over the shells of oysters, mussels and sometimes even marble. These are bored into until they are entirely dissolved and destroyed.

That very hard substance called flint was once supposed to be a sponge and live at the bottom of the sea. If you examine a piece of flint through a microscope, the sponge fibers may clearly be traced and the spiny spicules recognized.

## HYDROIDS AND JELLYFISH

The life story of the Hydroids and Jellyfish is stranger than a fairy tale. The slender graceful sea-firs or hydroids and the bell-shaped jellyfish do not look as if they were at all related, yet so closely are they linked in their life story that one cannot be studied without the other.

Hydroids grow firmly attached to shells, or rocks, or to the very floor of the sea itself, and so closely resemble plants that they are commonly mistaken for seaweeds. Indeed, you have to look very sharply with a microscope to find the little animals that live in the feathery branches. On each point of the stem is a dainty cup where a hungry little animal lives. The hydroids are higher up in the scale of animal life than the sponges, for they are the possessors of mouths and stomachs. As the tiny animal lies in its cup-shaped cradle, the mouth is directly in the center and opens right into the stomach. All about the mouth are thread-like feelers or tentacles. These may be extended far out from the body or drawn up so they cannot be seen.

The tentacles are used to draw currents of water toward the body so as to bring food within reach. But the little hydroid does not eat everything that comes in its way. It seems to know what food is suited to it and quickly throws out from its mouth any food it does not want. As it cannot go about in search of food and can only get what comes to it, it is fortunate that it has the power to choose. There are many kinds of hydroids and they grow in all parts of the ocean. Some grow to be three feet high and a single branch may be the home of one hundred thousand little animals. Each branch is a family, which sprang from one tiny egg. Other varieties look like beds of thick moss over the shells and rocks. These curious animals are of many beautiful colors, and among the plant life in the sea must make the bottom of the ocean look like fairyland.

Now let us see how the hydroids are connected with the jellyfish. The hydroid grows much like a plant, by budding and branching. Once in awhile pear-shaped cups larger than the rest are formed on the branches. These are spore-sacs and the substance they contain will by and by be formed into eggs. Then they will float away. The spore-sacs are quiet and lazy until the tiny cilia and tentacles grow, then they sail gayly away to investigate the ocean world. And marvelous to tell, they no more have to be tied to one place but may move freely about: they are not hydroids but jellyfish, yet they are the hydroids' own children.

The hydroids that have no branches have a way all their own of producing jellyfish. The main body divides itself into rings or plates, until the whole animal looks like a pile of tiny scalloped saucers. The top one begins to twist and squirm until it succeeds in working itself loose, then it floats away to lead an independent life as a jellyfish. Each ring, in turn, becomes a separate animal. This kind of hydroid produces some of the largest varieties of jellyfish.

When a jellyfish is taken out of the water it is an ugly shapeless mass, but in the water it is graceful and beautiful. These soft, helpless animals consist of a bell-shaped mass of jelly, from the inner surface of which hangs the body of the animal, with a mouth in the center. This mouth opens directly into the stomach and hollow tubes connect the stomach with a circular tube around the edge of the bell. Eggs are formed in these tubes leading from the center, and these eggs in turn become little floating bodies which soon fasten themselves to a rock or shell and grow into beautiful feathery branches and are no longer jelly-fish but hydroids. But wait; the next generation will see them jellyfish again. And so it goes on.

The jellyfish are friendly souls, so are often found floating in large companies. They swim by taking in and expelling water under the bell. This gives them a curious jumping movement. When the water is quiet and the sun warm they come to the surface, but they are timid creatures and if anything touches them the tentacles are instantly drawn up and they sink out of sight. Sometimes these tentacles are many feet long, yet can be so drawn up that they cannot be seen. Then, while you are looking to see where in the world they have gone, they lengthen out again. This wonderful power of contracting and extending the tentacles belongs to many of the lower animals of the sea.

On the tentacles are many tiny lasso-cells. These are used to procure food. These little sacs each contain a long slender thread, or lasso, floating in a liquid. When the cell is touched it bursts and out springs the lasso armed with a sharp sting. Woe be to the tiny crab or little fish that may have wandered that way. The victim seems stunned and does not try to get away. The tentacles coil around it and carry it to the hungry mouth of the greedy jellyfish. These lassos with their sharp stings serve as a protection to the helpless jellyfish from its numerous enemies. This is the reason they are sometimes called sea-nettles.

Some jellyfish are mere dots: others grow to be seven feet in diameter with tentacles floating fifty feet long in the water. Now the little hydroid that produced this giant was only a half inch high.

Jellyfish are of the most beautiful colors and of every shade and tint. Those of the tropical seas are darker than ours. But night is the time to truly enjoy the beauties of this queer sea animal. Vast number of different kinds of sea animals have the power of giving off light, called phosphorescence, from their bodies. Jellyfish glow with a golden light tinged with green. On a very dark night, when the water is stirred by a boat, it looks like furrows of liquid fire and every splash looks like a living flame.

## CORALS

Among the beautiful, interesting, and useful animals of the sea are the corals. Under this name are included those animals having the power to secrete a hard structure of the nature of a skeleton. Their home is in the deep water of a warm ocean, and while specimens of dead coral are to be found in nearly every home, very few people have had the good fortune to see the living animals. The reason for this is that they are such very delicate creatures that it would be impossible to take them from their home alive. They have to have the water at a certain depth. though different varieties flourish at different depths in the sea. Then if they are brought to the surface in the direct heat of the sun or the cold strikes them, their death takes place immediately.

**Branching Coral**

When the coral is alive the hard structure is covered with a soft flesh and all over the surface are tiny star-like animals called polyps. In the specimens of coral you have seen, you perhaps noticed that the surface was covered with tiny cups which made it very rough. Now each little cup was once the home of a tiny polyp. If you try to count them on one branch you will have some idea how many polyps go to make up a coral family. Sometimes there are millions in one group.

Inside the little cups are partitions that do not quite reach the center. The stomach of the animal hangs down between these walls. In the center is the mouth and the polyp is also provided with tentacles and lasso cells for capturing food. The coral polyps are not fastened in one place when they are young, but have the power to swim about freely in their ocean home. Their time of sightseeing, however, is short. When their home is chosen and their stomach and tentacles are formed, they begin to build their skeleton. Hard particles of lime are secreted from the sea-water and deposited in the soft flesh, and in this way the circular cup with its partitions is formed. This is the way new coral families are begun. After awhile it will begin to bud from the sides. These, in turn, will grow into branches constantly throwing out new buds until it finally grows into a beautiful branching community. As it grows, the lower portion dies and the living polyps are found at the top and ends of the branches.

But not all the kinds of coral are branching. Some grow in solid masses; others take the form of beautiful vases; and still others grow in clusters of tubes. They are all gayly ornamented with their beautiful starlike polyps. The warmer their ocean home is, the greater variety of delicate and beautifully colored corals will be found.

The mushroom coral is the home of a single large polyp. This resembles very much a vegetable mushroom turned upside down. In the centre is the hollow that corresponds to the little cups in the branching variety.

The organ-pipe corals grow in crimson tubes connected by flat plates. This presents a very gay appearance with its purple star-like polyps crowning each ruddy tube.

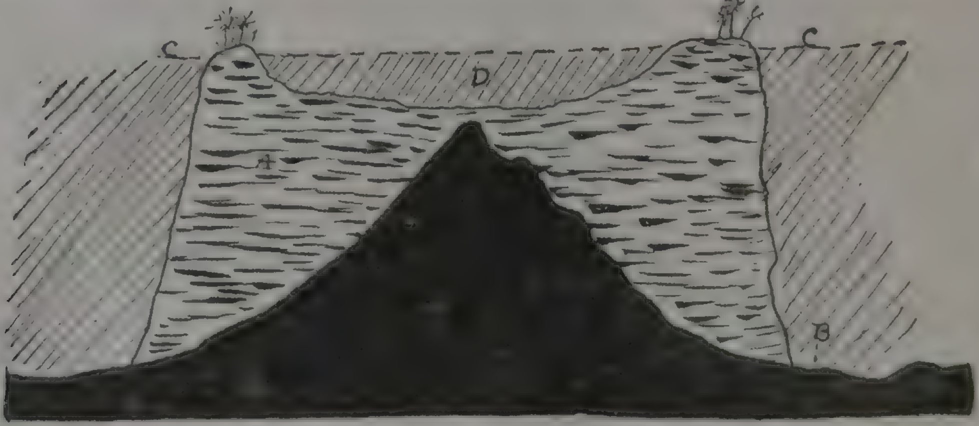
None of the corals are of great value for commercial purposes except the red or precious coral of the Mediterranean Sea. From very ancient times it has been prized for jewelry. The ancient Gauls used the red coral to ornament their weapons and helmets. The Romans hung branches around their children's necks to preserve them from danger, and even today in Italy it is supposed to protect the wearer from the evil-eye.

This coral grows on the rocks in the bottom of the sea. The branches are red and the polyps snow-white. Altogether it looks like a pretty red bush blooming with white flowers. The fishermen go out to gather the coral armed with heavy wooden crosses fastened to strong nets. The boats are rowed slowly and the men break the branches of coral off with the heavy crosses. Then all is lifted out and the broken coral is found caught in the meshes of the nets.

The coral reefs off the Algerian coast are divided into ten parts and one part is fished each year. Thus you see it takes ten years to grow a coral harvest. The value of the coral depends upon its size and color, rose-pink being the most valuable. This sometimes brings several hundred dollars an ounce, while ordinary red pieces about ten dollars an ounce. The little pieces used for children's necklaces are sold for only five shillings an ounce.

But the most interesting and wonderful thing about these tiny sea animals is their power to build islands and great reefs in the sea. These reefs are vast masses of coral that have grown in the tropical seas where there is a warm current. Some are many hundreds of miles long and many parts of our continents are now supposed to have been formed from coral reefs. The longest reef is that on the northeast coast of Australia. For nearly one thousand miles it fringes the coast in a strong barrier.

The ocean bed is composed of hills and valleys very much as is the land, and this made it possible for the coral islands to be formed. The lower part is formed by brain coral and other solid kinds that only live in very deep water. The coral island is first started by the coral polyps settling on the sides of one of the hills of the ocean bed. They grow and spread by budding and eggs until a ring is formed around the hill. It gradually grows upward and the lower part dies until that particular variety of polyps can no longer live at that lower depth of water, but the growth of the island is not by any means stopped. A polyp of the branching coral wanders by and finds the coral wall has just reached a height that will serve it for a home. It happily settles down and carries on the work of building. As it grows the branches become thickly interlaced; some break off and lodge in the holes between; substances floating in the ocean are driven in by the waves until all becomes a solid wall of great strength.



A—Coral Formation. B—Ocean Bed. C-C—Surface of the Sea. D—Lagoon

The outer wall of the coral reef is always steep and abrupt. Here the coral polyps thrive the best. The rough sea carries them plenty of food. Inside, the wall gently sinks with a long slope and here the sand and mud do not agree so well with the polyps. A different variety altogether is found usually within the lagoon, as the central lake is called. As no coral can live out of the water, the coral polyps die before the reef reaches the surface of the ocean. Then the sea tosses shells, seaweed, and other floating material upon it and the wall rises higher until it stands well above the surface of the water.

The soil is formed by the waves and wind and rain grinding and breaking up the shells and coral. Seeds drift there on the ocean currents and by and by the strange circle in mid-ocean becomes a fairy ring of living green.

## STARFISH AND SEA URCHINS

Who has not seen a dried specimen of a starfish. How yellow and hard it looked! Yet when it was alive and at home in a rocky pool it was a dull red color tinged with purple. And instead of being hard and dry it was puffed up with sea water until it looked quite plump. Starfish pick out a rocky shore for their home and spend their days climbing over rocks and creeping into crevices where the food they love is found.

They have to be where the tide will ripple over their bodies for they get their oxygen from the sea-water. The poor starfish that wanders too far inland will soon be half dead if he fails to get a frequent bath. The most common variety of starfish has five hollow rays or arms reaching out from the center like a star. If this curious animal happens to lose a ray another will grow in its place. and if it becomes frightened it can break itself all in pieces. Other varieties of starfish have long feathery arms and are very beautiful.

The top of a starfish is covered with rough spines and near the center, between two rays, is a small bright spot. This is called the "madreporic body," and is a sieve placed at the entrance of the tubes that run to the end of each ray. All the water that enters the tubes is in this way strained, so they are in no danger of becoming choked. The most important organ of this animal is the mouth, for it is a greedy creature whose chief business in life is eating. Oysters and clams are their favorite food. Indeed this preference is a source of great trouble to the oyster-growers. Many thousand dollars worth of damage is done every year to the oyster-beds by the starfish. In late summer or early fall they suddenly appear in great numbers, seemingly washed up from the deep sea. They fall upon the helpless oysters and many bushels are soon devoured.

Their way of making a meal is very curious and interesting. The rays are bent into a cup to hold the victim closely, then numerous little suckers appear and attach themselves so tightly that the oyster can in no way escape. Now the mouth is on the under side of the starfish, against the oyster, the stomach is turned right out into the shell and surrounds the soft body which is quickly sucked up.

Besides a stomach, starfish have a liver and intestines. These organs extend into the five hollow arms. From the mouth nerves run down the rays and in the end of each ray there is an eye. So each fish is the possessor of five eyes, but they need a good many for the eyes are not perfect and they probably see very little with them.

When a starfish is alive, on the under surface of each ray is a double row of hollow tubes. These are the feet, and each tube-foot has its own little bag of water which is kept filled from the water tubes that run down the rays. Now when the starfish wishes to take a walk it forces the water into the tube-feet, this causes them to lengthen and reach out. They then fasten themselves by suckers to the rock and as the tube-feet are shortened again by expelling the water the body of the fish is dragged forward.

The sea urchins do not much resemble the starfish but yet are near relatives. They look far more like a chestnut-burr, with their prickly green spines. Underneath tne spines there is a shell ornamented with knobs and trimmed with lace work between. This shell is very fragile, being no thicker than an eggshell. It is made up of hundreds of tiny plates fitted neatly together in five sections. There is the first indication of its relationship to a starfish. Imagine a starfish with its five rays bent upward until the points touched and the edges were together. That will give you a general idea of the sea urchins.

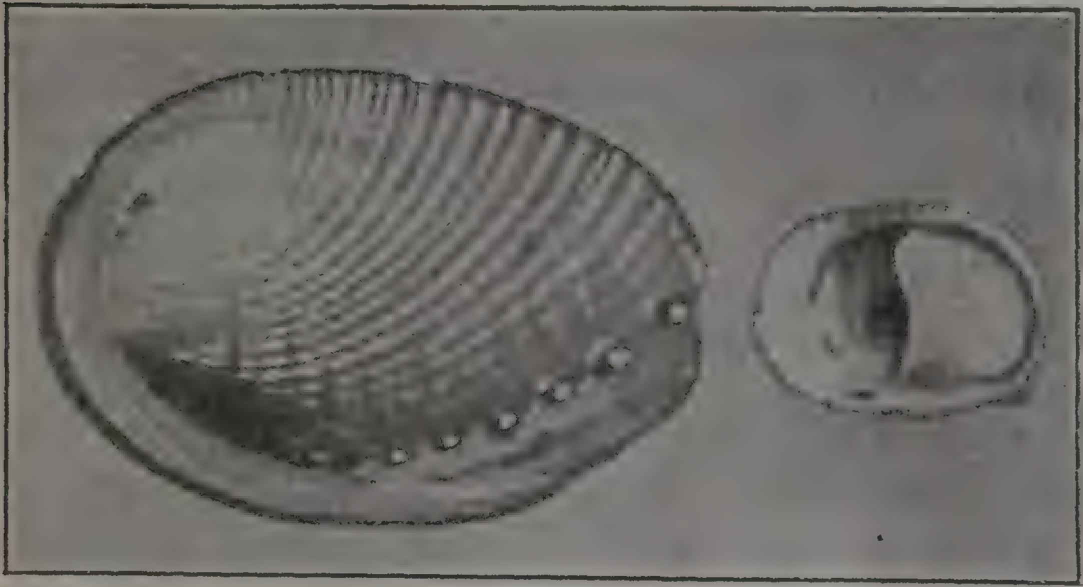
The mouth is underneath; the five eye-specks on top; while up and down along the sides are the rows of tube-feet. Also the madreporic body is not missing and it does the same work for the sea urchin that it did for the starfish. This round prickly animal is higher up in the scale of life than the starfish. It has all the organs of the latter and a heart and blood vessels besides, but you must not think that the blood that passes through them is like the blood of other animals, for it is not.

And not only is the sea urchin possessed of five eyes but it is the happy owner of five teeth. They are hard, and white, and sharp, and each tooth has a jaw of its own and works by its own muscles. These animals have the power to bore out homes for themselves in the hard rock and they do not make any mistake about the size, for when they are done they fit exactly. They also have a cunning little way of hiding themselves by heaping up bits of seaweed or gravel.

The sea urchins of the Mediterranean Sea are used for food and are eaten much like oysters. The ancient Greeks and Romans looked upon them as a great delicacy.

## OYSTERS AND OTHER MOLLUSKS

Soft-bodied animals that are protected by shells are called mollusks or shell-fishes. Their bodies are covered by a fine membrane called a mantle. This mantle secretes the shell. If the animal lives in a dangerous place the shell is generally very thick. Those varieties that live near the shore or in shallow water have thicker shells than the deep sea mollusks, because they are buffeted by the waves and are exposed to other dangers. Mother Nature also takes care of these animals in another way. Those kinds that are securely fastened in one place are of the same color as the surrounding objects, so are hard to find. Those that can move about freely from place to place are often very beautifully colored.



Some mollusks have two shells fastened together by a strong ligament like a hinge. These are called bivalves. Oysters and clams are of this class.

When an oyster is young the shell is thin; as it grows the mantle deposits layers of shell on the inside, each layer extending a little beyond the previous one. In this way the oyster builds its house just as it needs it and by the thickness you can tell its age. When the oyster has gotten its growth the shell does not get any larger but it does grow thicker, so that sometimes it almost seems to crowd the owner.

A strong ligament fastens the two halves of shell together and its office is to hold the shell open, for oysters commonly open wide their doors so that a stream of water is constantly flowing over their gills. As they cannot move about they dare not let any opportunity pass of getting food. But let danger come near and the shell closes with a snap. This is the way it is done. There is a strong muscle fastened just inside the valve and passing right through the body of the oyster. This is the only place the oyster is fastened to the shell. When this muscle is shortened the shell flies shut and when it is lengthened it opens. An oyster will live for a long time after it is taken from the water but it always keeps the valves closed to retain the water in its shell. When it dies the valve opens.

During the summer months the young oysters are hatched. The mother keeps her children right in the shell with her for a time and if they were not so very tiny she surely would be cramped for room, for it is said an oyster will produce a million young ones in a season. To make things somewhat more uncomfortable a little soft yellow crab sometimes insists on crowding into the shell too. When the baby oysters are ready to leave the parent shell, they rush out in such crowds that the water for a time looks milky. They are soon scattered by the currents and swim about for a time until they finally attach themselves to some firm substance. But before this happens many of the family have been gulped down by hungry fish, others have smothered in the mud; so after all only a few of the children live. Of those that survive the dangers that threaten little oysters, some settle on stones or sticks in the water and some on the backs of old oysters and become a part of an oyster-bank.

Oyster banks or beds usually exist in shallow sea water, upon a bottom of clay or mud. This must be firm enough to prevent their sinking. Besides salt the water must contain lime, for they need this for their shells. The helpless oyster fastened down in its bed has no chance to hunt its food. It just has to take whatever the current chooses to bring. This is usually very small plants and animals which are abundant in the parts of the sea where the oyster beds flourish.

Sometimes oysters are cultivated in artificial beds. Stakes are driven into the water and branches of trees, boards, and stones are placed between for the baby oysters to fasten themselves to. When all is ready several boatloads of oysters are dropped near by and, because they increase so rapidly, in two or three years they are ready for market.

Oysters are taken out of their beds by a dredge. This is armed with teeth, which when dragged over the bed, pull them loose. Both large and small are dragged up by this clumsy method and the young ones are thrown back again. Sometimes they will attach themselves the second time, but they often are smothered in the mud.

Oysters, from ancient times, have been used as food. There was an old Roman emperor, Vitellius, who, it was said, could eat a thousand oysters at one meal, but they may not have been so large as the oysters of today. Then there was a king of France who made his cook a nobleman because he cooked oysters so very well. It is told of the great general, Napoleon, that if he could get them, he always ate oysters before an important battle.

In different parts of the world there are many different kinds of oysters. There are the tree oysters that in warm climates fasten themselves to the trunks of mango trees in great bunches. There they are washed once in awhile by the tide and manage to save enough water in their shells to keep them alive until the next bath. In the China Sea there is an oyster with a very beautiful transparent shell. It is so clear that the Chinamen use it for windows. Red oysters grow on the coast of Spain and green oysters in Scotland.

On the coast of Ceylon there are the pearl oysters. This is the most important pearl-fishery in the world. The men that carry on this business are trained to stay under water a long time. They tie a heavy weight to their feet to enable them to sink rapidly and when they reach bottom they cast this off and quickly gather all the oysters near by and place them in a basket. Then they signal by a rope to their friends and are hauled on board the boat again. At noon all fishing stops, for the boats must be taken to shore and unloaded before dark in the presence of officers. This is done so that no one may have a chance to steal. The oysters are spread out on shore until they decay, when the pearls are easily taken from their open shells.

Pearls are formed in the shells by grains of sand lodging within between the mantle and the shell. It becomes covered with transparent layers, which the mantle secretes. Some pearls are round, some egg-shaped, and some pear-shaped. Some are irregular and are not worth much. The Shah of Persia owns a wonderful string of pearls in which each pearl is the size of a hazel nut.

Gasteropods are mollusks that have but one shell and they are very numerous—making up three-fourths of the mollusk family. They are of a most wonderful variety of beautiful forms.

Inside, the opening winds around the central column in a spiral, growing smaller toward the end. In tracing the coils you can see how the tiny gasteropod grew by adding coils to its shell as it needed more room. Just as in the oyster the mantle secretes and deposits the shell, it stretches over the rim and leaves a deposit of shelly matter and thus the edge is renewed and grows larger. Some gasteropods grow to be quite large. The mantle is often spotted with bright colors and as it builds the shell these bright spots and streaks remain on it, so that they are very beautiful. Some of the shells are smooth and others are covered by rough spines.

Unlike the oysters, the gasteropods have a distinct head. They also possess two tentacles and eyes. Probably also they can hear and taste. So you see they are the most highly organized of any animal we have yet studied. They have a thick, tough foot that they can stick out beyond the shell. This is protected by a horny plate which serves as a door to close the shell tightly when the timid gasteropod retreats inside from danger.

One of the most curious things about these creatures is their tongue. It is armed with many sharp teeth set in rows. This tongue grows as long as the gasteropod lives, new teeth being formed at the base and growing forward as the old ones are being worn off at the tip. With this tongue they file holes in other shells, and they know the very best place to attack the shell, for it is usually bored near the hinge over the softest part of the body of its victim. When the hole is finished, the body is sucked out through it. Who would think an animal protected by a hard stony shell could meet such a sad fate.

The gasteropod's digestive organs are pretty well developed. It also has a heart and it breathes by lungs or gills. Many of them can swim freely through the water, pushing themselves along by their foot.

## THE NAUTILUS AND ITS COUSINS

Just picture to yourself a bag several inches long surrounded by a broad border. A short tube comes out of this jelly-like body and above this the head sticks out. And such a head! It defies description, but more than anything else it resembles the head of an elephant. There are two square eyes that gleam like gold. It has eight elastic arms furnished with suckers and two others longer than these with club-shaped ends. Also it is armed with a strong sharp beak that looks like the beak of a parrot. This animal is a cuttlefish or sepia, and although very different from the mollusks in the previous chapter, belongs to the same family.

When alarmed the cuttlefish rapidly changes its color. Also within the body is a sac containing an ink-like fluid which it can throw out into the water and then escape in the surrounding blackness. This fluid is used in painting under the name of sepia or India ink. In ancient times it was all the ink the people knew anything about.

In addition to the cuttlefish's other accomplishments it has the gift of tears. At least it is well supplied with tear glands, though it would be pretty hard to tell what would make a cuttlefish cry.

On the inside of the mantle is a thin plate known as cuttlefish bone. This is used in bird cages, and as the bird picks at it he is getting a supply of lime to build up his own bones. The cuttlefish fastens its eggs to branches of sea weed and there they hang in clusters like bunches of grapes. It takes the eggs five weeks to hatch and when the little ones come out they are about the size of a grain of wheat. Sometimes the mother finds a safe retreat in a hole in the rocks as a nursery for her young family. She barricades the door with rocks and shells, so no foe can enter nor can the young ones run away.

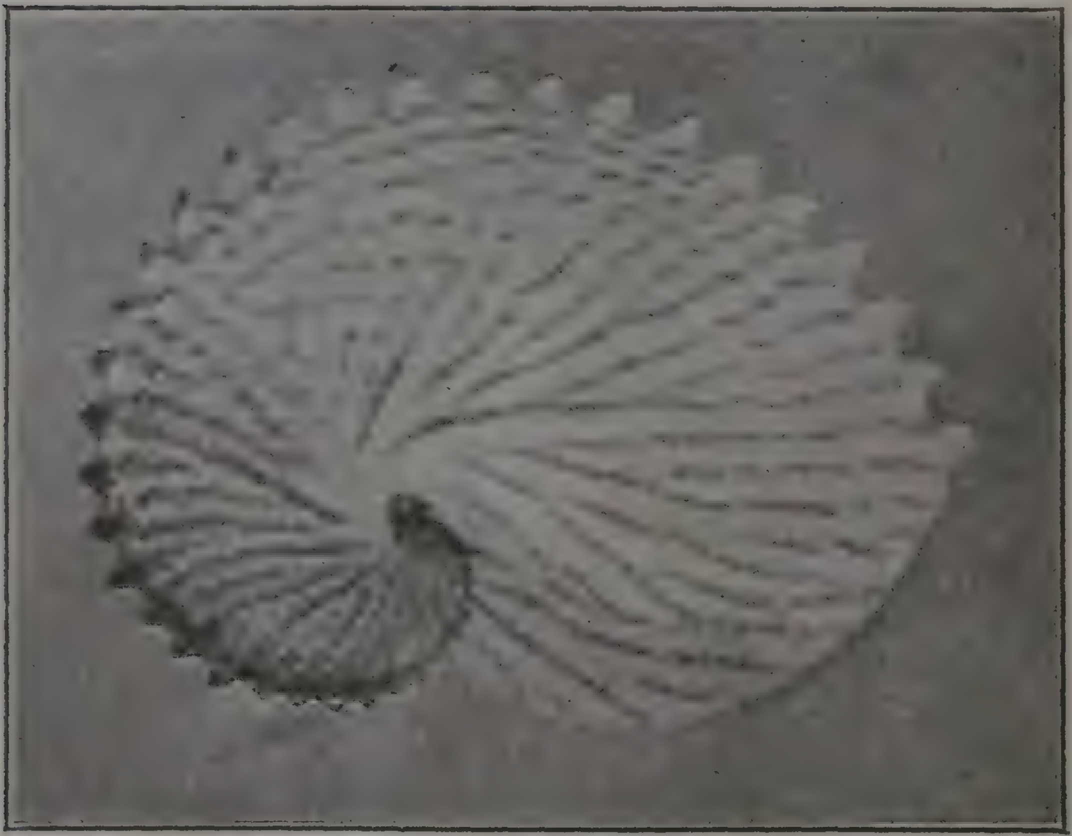
These ugly sea creatures are used as food in many countries. As they are neither meat nor fish the members of the Greek church are allowed to eat them during their long fasts.

The octopus or devilfish much resembles the cuttlefish. The eight arms or feet, whichever they are, that surround the mouth are longer than those of the cuttlefish. They have a double row of suckers on the under side and when they once attach them onto their prey it is impossible to get away. By them the victim is drawn down to the mouth and firmly held until torn into pieces.

They love to lurk in the shadows of rocks, with their long arms floating out in the water in search of their prey. They are great gluttons and destroy vast numbers of fishes, crabs, and mollusks. It is hard to tell how true the wonderful tales are that are told of the devilfish.

They are very active and have been known to jump entirely out of the water. They have two ways of getting about. They swim backwards by forcing the water out of their funnels in jets, and also walk head downward with the sac-like body turned up.

The octopus is caught alive and taken to market in southern Italy. There in a tub of sea-water these disgusting creatures writhe and twist their arms about. They stare with their cruel eyes and discharge water in quick jerks from their funnels. When one is sold the man seizes it by the neck and with a quick twist kills it.



**Paper Nautilus**

It is a pleasure to turn from the ugly and vicious octopus to the beautiful paper nautilus. This is regarded as one of the loveliest objects in the ocean. One can hardly realize that it belongs to the same family as the octopus and cuttlefish, and yet this is true. The chief charm of this animal lies in its lovely fluted white shell. This is so thin and transparent that it shows the dainty rose and silver tints of the body beneath. But when we look at the long arms provided with suckers and the wide-awake strange eyes and the curious funnel, we see that in spite of its beauty it is akin to the octopus.

One of the strange things about the nautilus is that it is in no place fastened to its shell. Neither does it entirely fill it. Its shell is a dainty boat in which it sails through its watery home, but instead of forward it goes backward. Sometimes it crawls on the bottom head downward with its shell on its back.

But the real use of the shell is to provide a cradle for the little ones, for it is only the mother nautilus that is provided with a shell. In this lovely floating cradle the young ones are hatched and there safely protected from the many dangers of the ocean.

Pearly Nautilus

Another member of this family is the pearly nautilus and it is also possessed of great beauty. Only a few specimens have ever been taken alive, so very little is known of its habits. It lurks down in the depths of the sea in tropical regions. The empty shells are often cast up by the waves and tide and if you were to cut one in two you would find that it was all divided into parts or cells and hence the animal is known as the chambered nautilus.

The animal lives in the outer and largest chamber. But each one in turn has been its home, and as it grew it walled it up with a curved plate of pearl and retired to a new and larger room. This is the way the shell increases in size.

## WHALES

Though whales cannot live away from the sea they are true air-breathing animals and have to have a regular supply of fresh air. They cannot live long without coming to the surface and their way of breathing is very interesting. When a sailor stationed on the lookout of a whaling ship sings out. "There she blows," he not only tells the captain that a whale is near but that he has seen it breathe.

The nostrils or blow-holes are situated on the top of the head. They are provided with valves to keep back the water from flowing into the lungs and drowning the whale. When the monster nears the surface of the sea it begins to drive out the air from its lungs. The water above the head is forced upward in a delicate spray forming a pretty fountain in the midst of the sea. This is ever a welcome and pleasant sight to a whale-ship's crew. While it is spouting the whale makes a sound like a wave dashing on the shore, so it is always impossible for it to hide from its enemies.

Whales are the largest animals now living either on land or sea. Their heads are one-third their enormous length, which is seventy or eighty feet. They are not fish but are formed much like them. Their tails are strong and flat and are set horizontally on the body. This is of great use to them, as it enables them to rise quickly to the surface or plunge into the depths. Their fore limbs are merely swimming paddles, while their hind limbs cannot be seen. They are mere rudiments of limbs under the skin.

The Greenland whale, which is so valuable for its oil, has no teeth and its throat has so small an opening that even an ordinary fish could not get through. The jellyfish that swim together in vast shoals in the Arctic seas form its principal food. The whale's mouth is furnished with broad plates of bone that hang from the roof. There are about three hundred of these whalebone plates hanging side by side. And from these comes the valuable whalebone of commerce. Outside, the edge of these plates is smooth and unbroken. but toward the centre of the mouth they are frayed out into

A Finback Whale, Caught on Cape Cod Shore coarse fringe. Thus the roof of the whale's mouth looks like a brush. This makes an excellent trap for catching the helpless jellyfish.

When it makes a meal the whale swims through a shoal of these fish with its mouth wide open. A stream of water is carried through the mouth bringing with it countless numbers of tiny soft animals that are securely caught in the bone fringe.

Whales are said to be devoted mothers and old skippers often tell tales of seeing them floating or swimming on the surface of the water with a flipper over the back of the calf. It is almost impossible to learn definitely of the habits of these sea animals, but it is thought that they often live to a great age.

Sperm whales live in great schools in tropical seas. They are provided with only one blow-hole near the end of the nose. Instead of the curious whalebone plates of the Greenland whale, they have cove-shaped teeth set in the lower jaw. They have a large square head in which is a large cavity. This is partly filled with a soft, fatty substance called spermaceti. Other cavities in the body are also filled with spermaceti which is used in making candles, ointments, and cosmetics. Because it possesses this valuable commercial product the sperm whale is vigorously hunted by whalers.

Nor is this all. In great quantities in the intestines of this whale is a waxy substance called ambergris. It has a pleasing odor and is used in the manufacture of perfumery. Sometimes masses of this substance are found floating on the sea and then it is easily gathered and sold.

The principal food of this whale is the cuttlefish. You remember they are provided with a parrot beak. Now when the whale swallows this beak it is supposed to produce an irritation in the intestines which causes the formation of ambergris.

From the Greenland whale we get the whale oil or blubber.

This blubber is a layer of fat beneath the skin. It sometimes covers the whale to the depth of two feet. It serves to help keep the great body afloat and then it keeps it warm in the icy waters of the Arctic sea.

A curious whale is the narwhal or sea-unicorn. It is armed with a strong tusk which reaches far out in front and makes a strong and dangerous weapon. It is merely one of its front teeth grown to a prodigious size. It sticks straight out in front in a line with the body and is twisted like a spiral and tipped with a point. As long as the narwhal lives this tooth continues to grow until it is sometimes eight or ten feet long. This tusk is very valuable, as it takes a fine polish and is very beautiful and white.

A careful lookout is always kept on board a whale ship. As soon as a whale is seen boats are sent in pursuit. The whale-boat tries to approach the monster from behind so it will not be seen. Swiftly and quietly it creeps up quite near and the harpooner rises to his gun and points it toward the animal's back.

As soon as the harpoon strikes the Greenland whale it dives straight down into the water. There it sulks for about forty minutes, drawing six or seven hundred fathoms of line. Other boats have arrived by the time it appears and all give chase, attaching more harpoons. The whale dives again and again but grows more and more exhausted. Finally it moves slowly enough to permit a lance to be thrust at its heart. The animal churns violently around in the water in its dying agony and finally rolls over on its side stiff and rigid in death. The body is then towed to the ship's side, the blubber is cut off and placed in the oil-tanks and the plates of whalebone are removed. An average Greenland whale will yield about fifteen tons of oil and fifteen hundred weight of whalebone.

## THE TIGER OF THE SEA

In all classes of animals we find certain ones whose part seems to be to prey on all the rest. Among the fishes are the sharks, among birds the eagles, among land animals the lions and tigers, and among insects the spiders.

While sharks like the salt water best they have been known to enter the mouths of rivers and even to go far up stream. They are found in all seas, but far more are found in tropical regions and they gradually grow scarcer until only a very few are found at the Arctic circle.

There are many, many different kinds of sharks. Some are almost harmless and others are fierce and dangerous beasts that are perfectly fearless in the pursuit of their prey. They are not at all backward about attacking even a man, should he be so indiscreet as to take a sea-bath in their neighborhood.

Some of these different varieties are only found near the shore and in harbors. Others, and they are the most numerous, live far out at sea but near the surface. The third group live at a great depth. Of the last we only know of a few species.

The sharks that live near the shore are smaller varieties than those that live out at sea.

The tiger shark which is found in the Indian Ocean is a very handsome animal, if anything so wicked can be called handsome. It is a brownish yellow and over this are black and brown bands and spots. If you ever meet it you will know it by its immense tail. It is shaped like a blade and is half as long as the whole fish. Some specimens of the tiger shark that have been captured were fifteen feet long.

Near the coasts of Australia and Japan lurks a curious species. They hide in quiet shadows. Near the mouth and about the side of the head they have a curious skinny leaf-like growth and the body is spotted and colored like a rock.

All this serves to hide the fish from its prey, for it looks, in the dark water, almost like a rock covered with a coralline growth.

But the sharks that live out at sea are the great tyrants of the ocean and the most dangerous to man. Some are armed with powerful cutting teeth and grow to immense size. Some will attach themselves to ships and have been known to follow them for weeks and sad is the fate of the unfortunate who falls overboard.

The largest sharks known live in the Pacific and Indian oceans. They are said to sometimes grow to be seventy feet long.

Very little can be said in praise of the shark family. They are both ugly and ferocious. But we must speak a good word for the mother shark, for she at least loves and cares for her babies. More than that, she keeps a loyal little nurse for them. From the time that they are born until they are old enough to care for themselves she never leaves them a moment. Then there is a tiny little fish of the mackerel family that shares her labors. We cannot even guess why this little fish is so devoted to the ferocious shark, but it certainly makes a quaint nurse. It is known as the pilot-fish and always swims just in front of the shark's broad nose as if to point out the way. At the least sign of danger the beautiful little pilot dashes madly around until it has succeeded in driving all the baby sharks into the safe haven of their mother's mouth. There they are kept until the danger is past.

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